circa 1955

Box 27 Folder 2

O. H. M. S.

R. & D. 17
R. 5956

Content #9

Contains charts + lists as well as articles. Title listed incorrect

① Empty envelope "O. H. M. S."

② Pencil sketch (of parts of maize?)

③ Two articles clipped together with handwritten letter from MacNeish to Jacques, annotated "Authorized J R? April 29, 1958." Articles, both by L. Kaplan + R.S. MacNeish, are both titled "Prehistoric Bean Remains from Caves in the Ocampo Region of Tamaulipas, Mexico"; one version is longer and more detailed than the second.

④ Five handwritten pages by MacNeish of manuscript and lists of settlements and artifacts.

⑤ Handwritten lists by MacNeish of his phases in Tamaulipas and plant remains (eg L = Lagenaria) in each.

⑥ Handwritten chart by MacNeish, "Stratified Components of Sierra de Tamaulipas" (2 pp)

⑦ Typewritten list of animal species in various phases in Tamaulipas, with handwritten notes by MacNeish (common names) and by ?, commenting on occurrence of remains. (1 page)

⑧ Handwritten list of plant remains fr. Tamaulipas (2 pp)

⑨ Typed chart (5 pp.) of occupations of various cultures

⑩ Typed chart of sites with radiocarbon dates (1 p.)

⑪ Typed list, "Sierra Madre Coprolites," of subjects of slides 1-121 (6 pp)

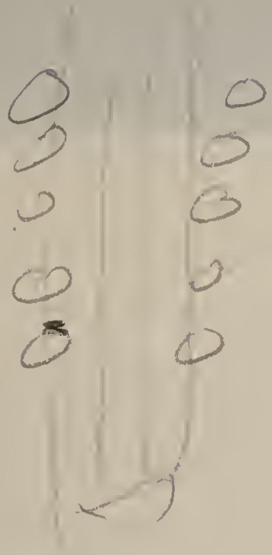
⑫ Two charts, "Sierra Madre Coporolites," of slides (2 pp.)

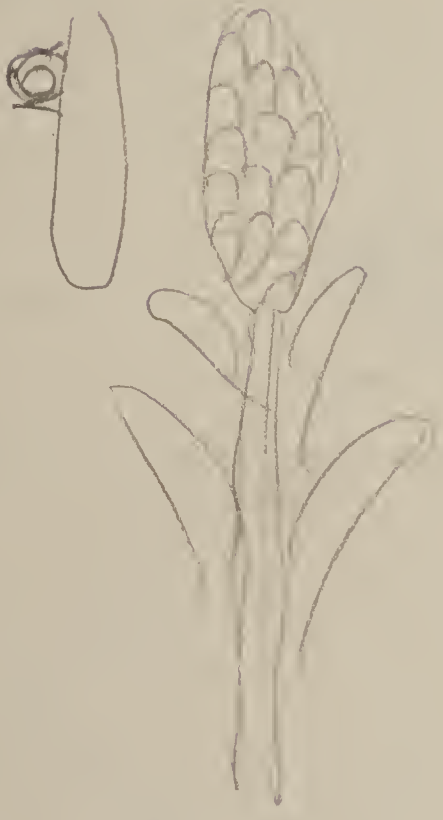
⑬ Chart, "Sierra Madre Coprolites," with remains fr. coprolites

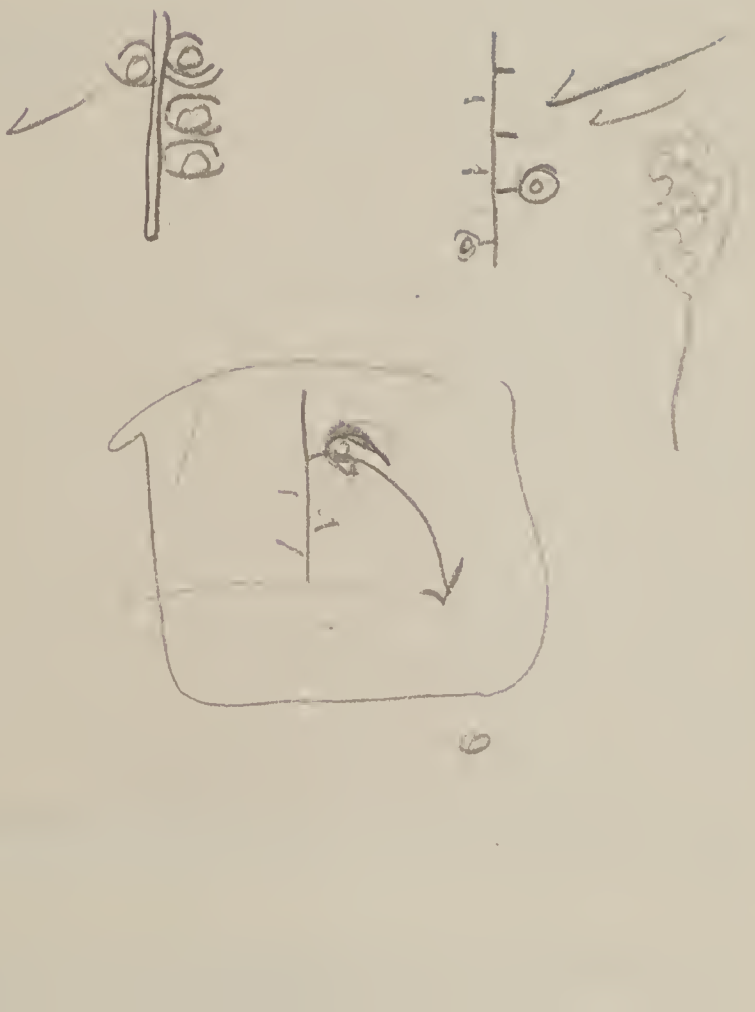
⑭ List, "Identification of the Cucurbit Materials from two Caves near Ocampo, Tamaulipas, Mexico" (5 pp.)

Tag "1958" clipped to folder.

JGL







Dear [illegible]

File [illegible]

I would appreciate your reading and criticizing this paper. Also, I would like your permission to submit it to the Harvard Botanical Museum Leaflet Series for publication

authorized

J R

April 29th 1956

PREHISTORIC BEAN REMAINS FROM CAVES IN THE OCAMPO REGION OF TAMAULIPAS, MEXICO

by

L. Kaplan

and

R.S. MacNeish

During the winter of 1954, under the auspices of the Botanical Museum of Harvard University, the American Philosophical Society, the American Academy of Arts and Sciences, and the National Museum of Canada, the junior author undertook archaeological survey and excavation in Tamaulipas, Mexico. The primary purpose of this investigation was to obtain specimens and information pertaining to the origin, development, and diffusion of prehistoric agriculture in the New World. One of the important prehistoric foods domesticated and dispersed prehistorically in the New World was beans. This report is concerned with the bean remains found in the 1954 excavations.

Tamaulipas is the northeasternmost state of Mexico and is along the Gulf Coast. The southwestern portion of this state was surveyed. This region shows considerable range in topography and vegetation from east to west. The boundary of the area to the east is the wide flat meandering Guajalejo River valley which has a tropical vegetation extending up from the south. West of this valley, running north and south, is the first ridge of the Sierra Madre which rises to a height of 3,000 feet and is covered by a tropical rain forest and having large pines on its summits. As one moves further westward the valleys become narrow and more canyon-like. The vegetation also gradually becomes desert-like with maguey, cactus, mesquite, and chaporal being predominate. The mountains also being higher (over 5,000 feet) and have a thin cover of pines on their rocky summits. It is in this latter type of region that we were fortunate enough to find three dry caves with stratified deposits of eight cultures, in the main associated with abundant preserved food remains (including beans)

As a background for the analysis of the bean remains it is necessary to describe the archaeological findings. The sequence is based upon stratigraphy

from three caves which is in part confirmed by Carbon 14 dates (See Fig. 1). Study of the artifacts from the various occupation levels revealed sequential cultural complexes from each cave, which re-confirm each other. Romero's Cave (Tm c 247) had sixteen occupation levels and a few artifacts below them belonging to the Infiernillo, Ocampo, Guerra, Mesa de Guages, Palmillas, San Lorenzo, and San Antonio complexes. Valenzuela's Cave (Tm c 248) contained nine stratified layers belonging to the Infiernillo, Ocampo, Flacco, San Lorenzo, and San Antonio complexes. All these cultural complexes had associated vegetal materials. Ojo de Agua Cave (Tm c 274) had twelve occupations and Infiernillo, Flacco, Palmillas, and San Lorenzo cultural remains. Only the upper Palmillas level had preserved food materials. The following chart illustrates the dating and correlation of the stratigraphy of the three caves.

TABLE I

		Tm c 247			Tm c 248			Tm c 274		
Cultural Phase	Estimated dates in years ago	Occ. layer	C. 14 date	C. 14 No.	Occ. layer	C. 14 date	C.14 No.	Occ. layer	C.14 date	C.14 No.
San Antonio	260	16			9					
		15								
	500									
San Lorenzo		14						12	520±200	M-501
	900	13			8			11		
	1100									
		12						10		
Palmillas								9		
	1800	11	1720± 150	M506				8		
La Florida	2400									
		10	3440± 250	M505						
Mesa de Guaje	3400	9	3650± 250	M505a						
		8								
		7								
		6	4730± 300	M504						
Guerra	3800	5								
					7	3945±334	6___	7		
								6		
								5		
								4		
								3		
Flacco	4300							2		
		4	4580± 350	M503						
		3								
		2								
		1	5230± 350	M502						
					6	5650±350	M497			
					5					
Ocampo	6000				4					
	7000									
					3					
		1a			2	8200±450	M498			
								1	8540±450	M500
Infiernillo	9000				1					

Many of the artifacts are like those of San Lorenzo but new point and pottery types occur as do large choppers and scrapers, historic goods were present in some levels and the woven twilled mats, coiled nets, and cloth were much simpler.

Though the culture phases seem to represent a unilinear development, the area is on the northern peripheries of Meso-America with many influences at different periods from the south. It is believed, however, that this peripheral region reflects, perhaps with some time lag, the general sequence of agriculture practices for all of Middle America. Its geographical position just north of Meso-America indicates that it is a key area for the understanding of diffusion of agriculture into North America.

The following section of the study of bean remains from Tamaulipas caves seems to bear out these generalizations. This study, of course, has considerable bearing on the solution of the problem of the origin and dispersal of prehistoric beans in the New World.

Ocampo [illegible]

[illegible]

Infiernillo
9000 years
X
x

Phaseolus
Amaranthus
Lagenaria

Zea mz

?

[illegible]

The Sequence of Cultural Phases

In briefly summarizing the artifact complexes I we shall emphasize what we know of the subsistence and domesticated plants utilized and (since this is a paper of [illegible] in botanical journal), with only a mention of the more diagnostic artifact types.

The people of the Infiernillo Phase were nomadic family bands of wild-plant collectors who did some hunting. They, however, utilized the domesticated gourd (Lageneria siceraria) and pumpkin (Cucurbita pepo). The seeds of the latter are, however, extremely small and if it was not actually wild, it was close to the hypothetical wild form. Wild plants collected that were capable of being domesticated included runner beans, chili pepper, and opuntia. However, these plants represented only a small portion of their diet which was mainly composed of a wide assortment of wild plants. Distinctive artifacts included~~included~~ Fuegian nets, loop-twine, and Fuegian baskets, flake choppers, pebble smoothers, checker-woven mats with oblique corners, short incipient contracting-stemmed and small diamond-shaped projectile points, firetongs, and digging sticks. Also included were a number of more general traits such as a number of kinds of choppers, side scrapers and scraping planes, round-based points and knives, atlatl and dart fragments, twilled mats, and a number of kinds of string with various knots in them.

Ocampo Phase had many more artifacts as well as more foodstuffs. These people were basically semi-nomadic plant collectors who did a little hunting and who gained a small part of their sustenance from domesticated plants. Their incipient agriculture included pumpkins (Cucurbita pepo), gourds (Lageneria siceraria), common beans of two varieties (Phaesolus vulgaris), chili peppers (Capsicum) and possibly, corn. We say possibly corn because though we found

no cobs or kernels in the refuse, an examination of feces from these levels revealed minute particles of corn cobs and leaves. This suggests that small primitive or green ears were being masticated and digested thereby leaving no cob or kernel remains in the refuse. Opuntia and runner beans were also eaten. Distinctive artifacts for this complex are Fuegian and full-turned coiled nets, three-over-three twilled baskets, twilled and plaited mats, large triangular and leaf-shaped atlatl dart points, interlocking loop coiled baskets, gouges, antler hammers, and a wide variety of larger scrapers (planes) and choppers. There also occurred more general traits such as different kinds of string and knots, mats, bone awls, wooden wedges, and dart points, bifacial knives, shell beads, mortars, gourd containers, and the like.

The Flacco Phase developed directly from Ocampo. These people were also semi-nomadic food-gatherers, but who did more incipient agriculture than hunting or trapping of game. Squash, gourds, corn, chili pepper, two kinds of common beans (found in the feces), Panicum, Amaranths, and runner beans composed about twenty percent of their diet. Long contracting-stem and indented-base points, mullers and mortars, spokeshavers, Fuegian baskets, spring traps and snares, twilled baskets, simple coiled bags, and elongate chisels are diagnostic traits. Though most of the heavy stone scrapers and choppers of Ocampo are not present, the more general traits continue to occur.

With the development of the semi-sedentary Guerra peoples there occurred a fundamental shift in diet. Though they still collected a vast amount of wild plants, agriculture remains compose most of the food energy. The most prevalent remains are corn cobs (Bat Cave race). Besides gourd and several varieties of pumpkin remains, squashes (*Cucurbita moschata*) appear. Peppers,

common beans, Amaranths, Panicum, and cotton also occur. The cave occupations and survey indicate the possibility that these people occupied small villages. Split-stitch, interlocking twist, interlocking loop, and simple stitch baskets built on a bundle foundation, small tear-drop, triangular and corner-notched dart points, rabbit sticks, leather huaraches, and other objects, mullers and manos, a twined woven robe, mats with woven borders decorated, as well as a wide variety of different kinds of string, and more general artifacts give this culture a distinctive mien.

Mesa de Guaje is very similar to the previous culture but most of the nets and baskets form have been replaced by plain weave cotton fabrics and plain black and brown pottery, scrapers and flint tools are very rare, straight-stemmed points occur for the first time as do manos and metates made of volcanic tufa, obsidian blades, clay disks, atlatl bunts, and knotless netting. These people also definitely lived in villages. In terms of nutrition probably more than half their food was derived from agriculture produce, the rest from wild plants. Corn is the main product and much shows teocentli intergression. Actual grains of teocentli occurred. Besides two varieties of beans, gourds, squash, pumpkin, amaranths, peppers, and cotton, sunflower seeds were present.

The next phase, called La Florida, did not occur in the caves but was found in the survey. It is typical of the Late Formative of Mexico with hand-modelled figurines, stemmed points, corner-notched points, prismatic blades, pottery bowls with tripod feet, and stone-faced pyramids around plazas.

The following culture, Palmillas, represents the cultural apogee of the region. It also represents the period of greatest diversity of agricultural

production. The greatest variability of pumpkin occurs at this time as well as gourds, warty squash (*Cucurbita moschata*)and walnut squash (*Cucurbita mixta*). A number of races of maize are present as are grains of teocentli. Three varieties of common bean occur as well as lima and runner beans. Besides these X plants *Manihot dulcis*, amaranth, chili, panicum, sunflower, nicotiana, and cotton occur. In bulk these plants represent almost half the plant material found while in terms of food value they represent a much larger proportion. Archaeologically this phase is represented by a mass of material and traits. Only a bare minimum of the diagnostic ones will be mentioned. These include corner-notched arrow and dart points, serrated corner-notched points, engraved red, brown, and black pottery, packboards with net centers and wooden rims, complicated woven mats and cotton cloth, platform pipes, and cane cigarettes, mold-made figurines, polished celts, circular pyramids, and house platforms, as well as many other stone architectural features.

Though the sedentary agricultural San Lorenzo is obviously derived from Palmillas, there seems to be a short gap in our sequence and a degenerate in their culture and agriculture. While all the kinds of cucurbita and beans appear, there is less variability. There are also only one or two races of corn, no teocentli, and only amaranths, peppers, cotton, and tobacco ~~appear~~. The bow and arrow along with a considerable range of arrow-point types appear, the pottery is crude burnished, brushed, and corrugated ware, mats are decorated with colors and split-stitch bundle foundation, baskets are plain, decorated cotton double-cloth appears, and a number of small crude end-scrapers.

The San Antonio culture represents an even further degeneration though these seem to have been sedentary agriculturists living in "ranchos." Corn seems to be of a single race, there are only kinds of beans and cucurbits (*Cucurbita pepo and moschata*), while gourds, cotton, and tobacco still occur.

place this title of p 10 in center [illegible]

Materials and Methods

The materials examined consist primarily of desiccated and uncharred bean pods and fragments of bean pods. Seed remains are few and often fragmentary. Since the bulk of the materials discussed in this paper are pods a brief treatment of the nature of bean pods follows.

In the Leguminosae gross morphology of bean pods can be diagnostic in species determination and is useful in delineating varieties of polymorphic species such as Phaseolus vulgaris. The legume or pod of the bean family is a single carpel with two identical valves which dehisce on dorsal and ventral sutures. At the basal end these elongate valves diverge from a pedicel and terminate at the apex in a straight or curved tip. Behavior of the pods at dehiscence is related to their anatomy and may differ markedly in different varieties. When the fruit is mature and dry, the valves split along dorsal and ventral sutures after which they may simply separate or they may twist to varying degrees. Twisting results in dislodgment of seeds and probably aids in their dissemination. The twist of one valve is the mirror image of that of the other and the twist of both is the result of a shortening of certain fiber cells in the pod wall.

In the production of beans which are threshed after the pods and seeds mature and dry on the plants it is essential that the pods be of the type which do not dehisce violently with the scattering of seeds prior to threshing. Manner of dehiscence is of little importance in varieties which are customarily harvested during damp weather or which are used in the green stage.

Violent scattering of seeds probably occurs in all wild species of the genus Phaseolus and the loss of this characteristic must have been one of the important features of domestication and variation in beans.

Identification of materials

Pods with other vegetal debris were received in separate packets according to site of collection, culture, and occupation level. After estimating the relative quantities of materials present in each occupation level tentative species identifications were made. Many of the twisted and folded pods were extended and pressed after softening in warm water with detergent as a wetting agent to facilitate their identification.

Phaseolus vulgaris (common beans) and *P. lunatus* (lima beans, the small seeded or sieva group) were recognized on the basis of their gross morphology. *P. coccineus* (runner beans) pod fragments were at first classified only as leguminous remains probably of a *Phaseolus* species or a closely related genus.

These *P. coccineus* remains were later identified on the basis of hilum characteristics of a single seed coat fragment still attached to a pod valve, and the dimensions of one almost complete valve which correlated in form and texture with the previously unidentified leguminous type. Although the hilum in question is within the size range of *P. lunatus*, the separate ridges of the caruncle excluded the possibility of its being a lima bean. The hilum characteristics of this fragment are similar to those of a rather large common bean, but the dimensions and fibrous to almost woody nature of the associated valve are similar to *P. coccineus* pods.

The possibility of this material pertaining to some other species not known as a domesticate was not overlooked. Through the courtesy of Dr. Frederick G. Meyer, then at the Missouri Botanical Garden, it was possible for the author to examine a list of species compiled from the extensive plant collection of Dr. Meyer and Dr. R. L. Dressler. Specimens of leguminous species appearing in their list and which might have fruits similar to the

X
or
for one of
the authors
or
a [illegible]
[illegible]

CUCURBITA

Lagenaria			Cucurbita foetidissima			Cucurbita pepo			Cucurbita moschata			Cucurbita mixta		
R	S	P	R	S	P	R	S	P	R	S	P	R	S	P
101		1	6	3			2	3		1	3			
50			2				1		1					
75	1		11	2		1	20						1	
27	1		19	3		11	23	5						
56			3	1		13	2	3			1			
77			7			6	1	2	6	1	2		1	
17			2					1						
11			2				1		5		2			
76			5			5	5	4			1			1
8	2		5	5		2	92	1			2			
9			1	6			5	1						
39						5	13							
1							24							
3			10					2			1?			
				1		25	1	1						
4			67	3		36	12							
70			19	6			3	1						
13			11			23								
10						2	10	2						
								1						
1				1		1	4							
				3			3							
1				2			1							
2				[illegible]		1	7							

BEANS

Phaseolus Vulgaris (3 or 4 varieties)	Canavalia	Lima	approx. corn (5 or 6 races)			approx. cotton				Tobacco		Animal bones?
			Trip.	Teoc.	Corn	String	Cloth	Seeds	Pods	Pipes	Cig's	
67 (124)				2	5000	1	1		?		1	~~203~~
86 (172)				2	1500	8	1		?	1?	2	~~36~~
8 (16)	7 (14)			2	224			5	?			~~138~~
16 (32)	1 (2)			2	610			5	?			~~140~~
203 (406)	3 (6)			5	4000	7	2	3			6	~~23~~
257 (504)	4 (8)	2(4)	1	5	4500	16	7	2		4	6	108
6 (12)	1 (2)	1(2)	2		20							75
63(126)				25	1000	2					2	31
113(226)				20	1500	12	2	9	1	3	12	63
9(18)	4(8)	13(26)	2	75	400	73			?			11
1(2)					200	1	1					37
1(2)			1	2	205	1	1		?			(158) 11
2(4)					1	57						55
1(1)	1(2)		1		4							35
												36
	6(12)		1		5							(612) 435 221
												74
	5(10)											50
2(4)	8(16)											43
1(2)	1(2)		2									32 34
	1(2)		1									19
												(457) 76
												0
	4(8)											221 52
	9(18)											86

archaeological fragments were examined in the herbaria of the Missouri Botanical Garden and the Chicago Natural History Museum. None was found to correspond to the material in question. By elimination, then, as well as by positive characteristics the identification of P. coccineus was verified.

Variation in the P. vulgaris pods indicated their division into three types, each of which is described below. These types are to be considered as of coordinate standing with the typology presented for Southwest United States beans by the author (Kaplan, 1956). That is, in the absence of diagnostic characters which can be obtained only from tye growing plants and complete herbarium specimens, the subspecific types are without formal taxonomic standing.

[illegible] al margin — P. vulgaris

X

Description of types

Pod characteristics are summarized in Table II; the types discussed below have been given descriptive names and are numbered in sequence with archaeological beans described elsewhere (Kaplan, 1956).

Yellow seeded bush, C 31. The bush habit is indicated by remains of two plants with fragmentary fibrous root systems diverging from the bases of stems bearing fruiting branches. The curved pedicels are .8 - 1.5 cm. long borne in pairs on 5 - 6 cm. peduncles. The pods would have been borne at 15 to 20 cm. above soil surface and appear to be fewer than 10 per plant although this could be highly variable. This variety was probably harvested by pulling the entire plant since many of the pods have remained attached to stem sections. In contemporary Mexico bush beans are frequently harvested in this manner, the bundles of dried plants are stored in or near the habitation, and threshed by

beating on a mat as opportunity or need arises. The yellow to yellow tan color of the rare seed coat fragments associated with the pods possibly represents a change in hue from cream.

This group includes thin-walled variants probably picked when young. Thick-walled variants are more common, particularly in the San Antonio phase; 20 of 26 fragments in one San Antonio packet are thick-walled. It is not possible to say whether this is a genetic variation or the result of growing conditions. Lesions which appear to be anthracnose (Colletotrichum lindemuthianum) injuries are found occasionally on all types but are abundant on the thick-walled variants.

Black seeded bush, C32. The pods are moderately curved with thin and relatively nonfibrous walls. In the immature condition the fruits of this type might have been useful as snap beans, however, displacement of the interstitial parenchyma tissue shows the seeds to have been mature when harvested. A single pod of this type was found containing three small black seeds (Table II). The nontwining shoots on which pods have persisted indicate this to be a bush variety probably harvested in a manner similar to that suggested for the previous type. In contrast to all other types described here the valves of "black seeded bush" are almost all joined at the base and attached to the pedicel.

Long pod, C 33. The pods are curved but show little variation in breadth from base to tip, that is, there is little tapering, nor is there constriction of the dry pods between the seed positions. Most of these valves are dark reddish brown in color and have a cartilaginous rather than fibrous texture when wet. An occasional pod is encountered with the pedicel and peduncle

still joined, these are approximately 1 and 3 cm. long respectively. None of these fruiting branches is attached to a main stem which suggests that "long pod" is vining and harvesting involved the pulling of individual pods as is the common contemporary practice with pole beans. No seeds have been found attached to the pods. A few fibrous walled variants of C 33 (C 33a in Tables I and II) are present which have usually contained more seeds than the type and are correspondingly larger.

Discussion

center

Sub title [illegible] 'runner' to [illegible] to [illegible] for p. 17

Of greatest interest in this group of legumes is the occurrence of Phaseolus coccineus remains, which constitute the first definite archaeological record of this species (Kaplan, 1956). In contemporary agriculture these beans are grown mainly in the highland of Chiapas and the Valley of Mexico. From the Federal District to Querétaro they are frequent and further north are found only occasionally in Mexico and into the southwestern United States where at least two varieties are cultivated by the Hopi. Runner bean use by the Hopi is almost certainly an historic introduction in view of their absence from archaeological sites thought to be associated with Hopi prehistory.

In July of 1957, one of us (Kaplan) briefly visited Ciudad Ocampo below the Sierras in which the caves are situated with pods of the excavated P. coccineus and seeds of purple variegated and self-colored white modern runner beans. During the Sunday market residents of Ocampo and others from villages higher up in the Sierras were shown the samples and asked to identify them. No one recognized the seeds or pods as belonging to wild or cultivated plants with which they were familiar. It is safe to conclude that P. coccineus

is not now utilized in the area in which the excavations were made.

The archaeological runner bean pods, despite their morphological similarities to modern types differ from them in certain microscopic features. Some of these differences are quantitative and are related to cell wall thickness and fiber cell size. Also the archaeological pods are more tightly twisted than those of modern cultivated varieties. Most striking is the abundance of sclerids or stone cells in the archaeological material as contrasted with their absence in modern runner bean pods. Although the reduction of sclerids in the domestication of fleshy fruits is of obvious adaptive value, this would not constitute a selective factor in the domestication of beans. Even if the pods were used in the green state, it is doubtful that the appearance of more edible varieties with fewer stone cells ever appeared as the result of human intention. Since these cells affect qualities of pods which would be used in the immature state,any selection for their reduction would have required the application of rather advanced concepts of plant breeding which probably were not at the disposal of pre-Columbian peoples in the New, or for that matter in the Old World at that time. It may be that the deposition of lignin to form stone cells is related to more general physiological processes which were subject to selective influences.

There is no apparent dissimilarity between early and later P. coccineus pods in this site. There are no pods which could be considered as intermediate in reduction of hard texture and fiber between the early Tamaulipas material and modern varieties.

There are, then, remains of P. coccineus pods, anatomically more primitive than modern types, in inhabited sites and corresponding at later occupation

levels (see introduction and Table I) with definite evidence of agriculture. Two closely related problems remain to be solved. These are: the absence of this species from late Ocampo to the beginning of Palmillas (Table I) and its failure to continue into historic times, and the status of this species as a domestic or wild plant in the periods of cave occupation.

The loss of runner bean use in Tamaulipas probably resulted from the effect of climatic change on plant distribution. Preliminary studies (MacNeish), in conversation) indicate that this region has passed through at least two warm climatic cycles. The earliest of these was presumably warm and moist as its duration was marked by the presence of Manihot from late Flacco to about the beginning of Palmillas (See Table I). Runner bean remains are absent during this thermal period of more than 2000 years although they are present both before and after. This absence cannot be explained by the prevalence of poor conditions for vegetal preservation in the caves since cucurbit materials are abundant during this time (Whitaker, et al, 1957).

The return of P. coccineus remains after the beginning of Palmillas strongly suggest the response of a wild rather than cultivated plant. A cultigen absent for 2000 years would hardly be expected to be reestablished with the return of favorable climatic conditions. Reintroduction is possible, but from where? The U.S. Southwest could not have been a source for reasons already noted and plant migration from regions south of Tamaulipas would have been highly unlikely since conditions there would have been even less favorable for the survival of a cultivated plant with cool temperature requirements. An indigenous plant, on the other hand, may have formed relic communities in protected locations and become more generally distributed and available for human use at the end of the

thermal period. A second thermal period might well have been the cause of the extinction of P. coccineus from this part of its natural range.

The hypothesis that P. coccineus may have been a wild rather than cultivated plant in Tamaulipas is supported by the extreme age of the remains and their occurrence long before the practices of ceramic cooking and agriculture, and the apparent lack of selection for pod characteristics found in modern cultivated varieties. If runner beans were present but not domesticated in Tamaulipas in spite of their being included in the gathered plant complex prior to and during agricultural times, another problem arises. Why would so useful a food plant be neglected as a domesticate in Tamaulipas but be brought into cultivation in Chiapas? The answer is probably to be found in the reaction of P. coccineus to the differing photoperiods in these widely separated areas of its range.

Allard and Zaumeyer (1944) studied the reaction of various leguminous plants to day length. A daily exposure to less than 13 hours of daylight resulted in a considerable delay in flowering date of P. coccineus which was accompanied by tuberization of the root system. Longer day-lengths brought about earlier flowering and tuberization did not occur. Chiapas at about 16° of North latitude with days of less than 13 hours of light during the growing season corresponds to the delayed flowering - tuberized root situation while Tamaulipas at about 23° of North latitude has photoperiods of more than 13 hours during most of the growing season.

In the highlands of Chiapas, the fleshy roots of runner beans are eaten by Tzeltal Indians (fieldwork, 1957). If this is a retention of an early practice (as suggested by Edgar Anderson in conversation) then it is possible that domestication of runner beans was based upon root as well as seed use. Such a practice could not have occurred in Tamaulipas since tuberization does

not occur because of the long-day - short-night condition.

Common beans

Types of Phaseolus vulgaris, not generally distinguishable from modern cultivated varieties appear in abundance beginning with the Mesa de Guaje level, at about the same time that intensive agriculture and fired ceramic wares were introduced. Bean remains in nonagricultural, prepottery Ocampo and Guerra cultures are limited in numbers. This situation is similar to that in the Southwest, where in the Mogollon and Basketmaker - Pueblo regions the increase in bean remains is correlated with the introduction of pottery (Kaplan, 1956).

Common beans, appearing for the first time in the Ocampo culture, join the already established Cucurbita pepo (Whitaker, et al., 1957). Both of these antedate the appearance of corn. This is the only area in which common beans have been shown to occur prior to corn, and the early bean types persist into more recent archaeological times.

The presence of these bean types in early prepottery times followed by an expansion of their use with the introduction of pottery agrees with the hypothesis presented (Kaplan, 1956) to account for the remarkable constancy of bean types over long time spans in the Southwest. That is, that beans entered as domesticates very early, were sparingly cultivated until the use of pottery began and then the same, long established, well adapted varieties came into more general use.

Sieve beans

Small seeded limas, or sieva beans, were introduced late and never attained much importance. Their paucity here substantiates other evidence

indicating that these beans entered the U.S. Southwest through the west. Sievas appear in the Verde Valley and at Point of Pines but not in the more easterly Mogollon and Basketmaker - Pueblo areas. With the study of additional remains in the future some relationship between southeastern United States and northeastern Mexico sievas may be shown.

Tepary beans

The absence of tepary (P. acutifolius var. latifolius Freeman) remains supports present knowledge of their pre-Columbian and historic distribution. Bukasov (1930) and others have indicated a western distribution for contemporary tepary cultivation while Carter (1945) has shown a spread of tepary cultivation from south central Arizona to the north and east in late pre-Spanish times.

SUMMARY

1. A total of 845 bean pod fragments from three archaeological cave sites in Tamaulipas, Mexico, were studied and identified. These remains consist of: Phaseolus vulgaris (3 domesticated types), P. coccineus (one nondomesticated type), P. lunatus (one domesticated type).
2. These beans are considered to be distinct from those occurring in the U. S. Southwest.
3. It is thought that P. coccineus, although gathered as a useful wild plant, was not domesticated in this region because of non-tuberization of the roots under the photoperiod conditions of Tamaulipas.
4. P. vulgaris remains first appear with preagricultural materials 4300 - 6000 years ago and are the oldest common beans yet reported. They ante-date corn

but are later than squash in these sites. P. *coccineus* remains, the earliest of which are dated 7500-9000 years ago, constitute the only archaeological runner beans on record. P. *lunatus* remains are few and are present 500-1800 years ago.

BIBLIOGRAPHY

Allard, H.A., and W. J. Zaumeyer. 1944. Responses of beans (Phaseolus) and other legumes to length of day. U. S. Department of Agriculture Tech. Bull. 867: 1-24.

Bukasov, S. M. 1930. The cultivated plants of Mexico, Guatemala and Colombia. Bull. Appl. Bot. Gen. Pl. Breed., Suppl. 47: 151-176.

Leningrad. (Mss. translated from the Russian by H. J. Kidd, Ann. Mo. Bot. Gard. 41: 271-299. 1954).

Carter, George F. 1945. Plant geography and culture history in the American Southwest. Viking Fund Publications in Anthropology 5: 1-140.

Kaplan, Lawrence. 1956. The cultivated beans of the prehistoric Southwest. Ann. Mo. Bot. Gard. 43: 189-251.

Whitaker, T. W., H. C. Cutler and R. S. MacNeish. 1957. Cucurbit materials from three caves near Ocampo, Tamaulipas. American Antiquity 22: 352-358.

TABLE I

DISTRIBUTION OF BEAN REMAINS

Culture	Tentative age years ago	*P. coccineus* valves	*P. vulgaris* valves				*P. lunatus* valves	Total in each culture
			C31	C32	C33	C33a		
San Antonio	200 - 500	1	40		35			76
San Lorenzo Occupations 13, 14, 15, 16	500 - 900	21	296	45	111	4	3	480
Palmillas	1100 - 1300	11	206		14		1	232
Mesa de Guaje	2400 - 3400		16		3			19
Guerra	3400 - 3800		1					1
Flacco	3800 - 4300	13						13
Ocampo (Port~~ales~~)	4300 - 6000	4	5		1			10
Infiernillo	7500 - 9000	14						14

TABLE II

SPECIES AND VARIETAL CHARACTERISTICS

SPECIES & TYPE	POD CHARACTERISTICS					SEEDS			
	length cm.	dorso-ventral width cm.	twist of valves	no. seeds per pod	tip	length cm.	width cm.	thickness cm.	color
P. vulgaris									
C31	7-9	0.8-1.2	slight	3-6	short-straight	fragments only			yellow to yellow tan
C32	6-7.5	0.7-1.1	slight or none	5	straight to down-curved	9-1.0	.6	.4	black
C33	11-13.5	1	moderate	7	few intact fragile	....	....	....	......
C33a	13-15	1-1.5	moderate	8	few intact fragile	....	....	....	......
P. coccineus	greater than 11	1.5 or more	tight	...	none intact, probably short and stout	....	....	....	dark, probably purple
P. lunatus	about 12	3	slight	...	none intact				

Prehistoric Bean Remains

Two

~~CUCURBIT MATERIALS EXCAVATED~~ FROM ~~THREE~~ CAVES
NEAR OCAMPO, TAMAULIPAS, MEXICO

L. Kaplan and

Thomas ~~W. Whitaker, Hugh C. Cutler and~~
Richard S. MacNeish *

BACKGROUND

The ~~cucurbit~~ bean materials identified and discussed in this report were excavated in 1954 by the ~~third~~ junior author from ~~three~~ two caves in the Sierra Madre near Ocampo, Tamaulipas, 5,000 feet above sea level (see Fig. 1).

These ree caves were excavated by this expedition under the auspices of the American Philosophical Society, the American Academy of Art and Sciences, the Botanical Museum of Harvard University, and the National Museum of Canada. The first cave, called Romero's Cave (Tm c 247), had 16 stratified occupational layers. Most of these occupation layers contained preserved vegetable materials and revealed a sequence of 7 artifact complexes. These artifact complexes are called, from Early to Late, the Infiernillo, Ocampo, Guerra, Mesa de Guaje, Palmillas, San Lorenzo, and San Antonio. The second cave, (Tm c 248), contained 8 stratified layers belonging to 5 artifact complexes: Infiernillo, Ocampo, Flacco, San Lorenzo, and San Antonio. In the third cave (Tm c 274), vegetable materials without beans were found only in the upper layers with the Palmillas and San Lorenzo artifacts but below them Flacco and Infiernillo tools occurred. On the basis of these stratified data a sequence of 8 cultures has been determined and they are listed in Table I with tentative ages. (MacNeish, 1954: 323-327).

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* We are indebted to the John Simon Guggenheim Memorial Foundation for assistance in carrying out this work.

The sites are on the northern edge of the great prehistoric cultural development of Mexico. Cultural connections with areas to the south are evident in the last 4 cultures but they are probably differentiated from the cultures to the south by a noticeable lag in time. The first 4 cultures or phases at Ocampo have no cultural equivalents to the south but they do have them in the Sierra de Tamaulipas to the east. (see Fig. 1). (MacNeish, 1950: 79-96; MacNeish, 1955: 108-115.

The earliest culture remains, the Infiernillo phase, are perhaps more than 4,800 years old and represent a group who were basically wild-plant collectors but who did some hunting. A few pods of jack beans (probably wild) and squash "rinds" and seeds occurred at the latest level. The artifacts consist of an extensive series of very large and crude choppers and scrapers, a few diamond-shaped and leaf-shaped dart points, checker-woven mats and a few distinctive nets and coiled baskets.

put in fn

The Infiernillo remains seem to grade into those of the Ocampo phase, representing another group that were basically wild-plant collectors though remains of pods of jack beans, common beans, and quite a bit of squash suggest some planting. Large triangular and leaf-shaped atlatl dart points, as well as crude choppers, gouges and scrapers occur, and there is a series of new string, basket, mat and net types, and many wooden tools. Dating of this culture has a fairly sound basis. One specimen of vegetable remains has been dated by W. F. Libby by the Carbon-14 method as 3,945±334 years old (Libby, 1955:personal communication). Another specimen, (C637), from La Perra cave associated with a very similar culture complex has also been dated by Libby as 4,445 years old (Libby, 1952: 26). Specimens of charcoal remains from the site of the Falcon Dam

of Texas, associated with an archaeological complex very similar to the Ocampo phase, have been dated by the Radio-carbon Laboratory of the University of Michigan as 4,650±300 years old. (Suhm, Krieger and Jelks, 1954: 365).

Flacco, in turn, developed from Ocampo. The choppers had disappeared and new types of dart points (with a small contracting stem), string, baskets, twilled mats, nets, and scrapers had appeared. Though most of the diet of the Flacco people still consisted of wild food plants, a fair number of bean pods, and fragments of squash, as well as one or two fragments of very primitive (Bat Cave?) corn, were found. The estimated age of this culture, 3,000 to 3,800 years, is based on an estimate of Texas culture with similar projectile points. (Suhm, Krieger, and Jelks, :1954: 27-62).

Guerra is the next phase in time. Besides wild food plants, bean pods, corn of Bat Cave type, much squash and gourds,and some fragments of woven cotton were found. Distinctive small and triangular and leaf-shaped projectile (dart) points, baskets, nets, mats with decorated edges, string, and wooden tools also occur. This culture (as well as part of the previous one) may have been contemporaneous with the beginning of village life and pottery making farther south in Mexico, some 2,300 or 3,000 years ago.

The next culture, Mesa de Guaje, which occurred 1,800 to 2,300 years ago, saw the introduction of pottery, figurines, and village life to the area and it had many cultural affiliations southward. The peoples were agriculturists and grew corn (with teocentli), beans, squash, gourds, and cotton. Artifacts include loom-woven cotton cloth, a whole series of distinctive nets, mats, hand-modelled figurines, split-stick baskets, straight-stemmed, triangular and small, ovoid dart points and wooden tools. Remains of these materials may be cross-dated

with late formative materials, El Prisco of the Huasteca (Ekholm,1944: 267), and inferentially connected with late formative remains in the rest of Mexico. Carbon-14 dates (C202, C200, C424 and C425) for such cultures range from 2,000 to 2,600 years ago. (Johnson, 1951: 5-17).

The Palmillas phase (900 to 1300 years ago) is the cultural apogee of the area and saw the construction of large towns (or cities?), stone pyramids and house platforms, the introduction of tobacco, platform pipes and cigarettes, the bow and arrow, finer cotton weaving, complexly woven mats, various kinds of string, serrated corner-notched projectile points (both arrow and dart), and mold-made figurines. Its means of subsistence was agricultural like that of the previous period. This culture complex appears almost identical with that of the Zaquil Period (Period IV of the Huasteca) and parallels late Classic Period of the rest of Mexico. (Ekholm, 1944: 352-358, 427).

San Lorenzo had a similar subsistence but the cultural materials were definitely more poorly made. They include corrugated and brushed pottery, many notched and triangular arrow points, simple twilled mats, cotton weaving, and a host of small scraping tools.

San Antonio, which lasted into historic times, was a continuation of the previous culture. The material culture was even less complex, and the villages were smaller and without stone construction. Generally speaking, there is good evidence for cultural continuity with change brought about by internal development and by diffusion of culture from the south. Further analysis of the skeletal material from various horizons should confirm this hypothesis.

Tmc 247			Tmc 248			Tmc 274				
Occ. layer	C. 14 date	C. 14 No.	Occ. layer	C. 14 date	C. 14 No.	Occ. layer	C. 14 date	C. 14 No.	Cultural Phase	Estimated dates in years ago
16			9						San Antonio	260
15										
										500
14						12	520 ± 200	M-501	San Lorenzo	
13			8			11				900
										1100
12						10				
						9			Palmillas	
11	1720 ± 150	M506				8				1800
									La Florida	2400
10	3440 ± 250	M505								
9	3650 ± 250	M505a							Mesa de Guaje	3400
8										
7										
6	4730 ± 300	M504								
5									Guerra	3800
			7	3945 ± 334	c____	7				
						6				
						5				
						4				
						3				
						2			Flacco	4800
4	4580 ± 350	M503								
3										
2										
1	5230 ± 350	M502								
			6	5650 ± 350	M497					
			5							
			4						Ocampo	6000
										7000
			3							
1a			2	8200 ± 450	M498					
						1	8540 ± 450	M-500		
			1						Infiernillo	9000

Figure 22. Stratified sites comprising the archaeological sequence of the Sierra Madre of southwest Tamaulipas (after Kaplan and MacNeish, 1960)

No. of C.14 specimens	Age	Sierra Madre	Sierra de Tamaulipas	Comments
		San Antonio		
M-501	520	San Lorenzo		Acceptable
C-207	651		Los Angeles	Acceptable
			La Salta	
M-506	1720	Palmillas		
			Eslabones	Acceptable but early
			Laguna	
M-505	3440	Mesa de Guaje		Possible but earlier than expected
	3650	Mesa de Guaje		
M-504	4730	Guerra		Too early. Not acceptable.
C-	3945	Flacco		Acceptable
M-499	9270		Almagre	Too early
C-408	4445		La Perra	Acceptable
M-503	4580	Ocampo		Acceptable
M-	4665		(Falcon - in Texas)	Acceptable
M-502	5230	Ocampo		Acceptable
M-497	5650	Ocampo		Acceptable but early
			Nogales	
M-498	8200	Infiernillo		Acceptable but earlier than expected
M-500	8540	Infiernillo		
M-499	9270		Lerma	Acceptable if it is a substitute for M-499
			Diablo	

Appearance of Domesticated Plants

in Tamaulipas

University of
Michigan

Carbon 14
determination

Years ago:

502 - Maybe - tomato.

1720 - (Number of races of corn, squash and beans.
(Tepary beans.
(Cucurbita mixta.
(
(Tobacco.
(
(Chile huapalane.

2400+ - Manihot.

3400 - (Number of varieties of hybridized corn.
(Lima beans.
(Teocentli.
(
(Cucurbita moschata.

about
3700 - Cotton.

3945 - Bat Cave corn. - capsicum.

4450 - Primitive Nal-tel corn.

5830 - Common bean

5650 - Canavalia jack bean.

6200 - Gourd, squash, and maybe small lima beans.

[illegible]	Estimated date in years ago	Tm c 247				Tm c 248				Tm c 274			
		C. 14 date	Level	Occ.	Pollen specimens	C. 14 date	Level	Occ.	Pollen specimens	C. 14 date	Level	Occ.	Pollen specimens
	200												
San Antonio			1	16									
			1A	15									
	500												
San Lorenzo			2	14			1	8			1	12	
			2A	13	10		2	7			2	11	
	900												
	1100												
Palmillas			3A	12							3	10	
		1720	3	11							4	9	
	1800										5	8	9
	2400												
Mesa de Guaje		3440	4A	10									
		3650	4	9									
	3400												
Guerra			4B	8									
			5	7									
		4730	6	6									
			7	5	8								
	3800					3945	3	6			6-11	2-7	7
Flacco													
	4300												
		4580	8	4	5.6								
			9	3	4	5650	3A						
Ocampo			10	2	3		4	5					
							5	4					
		5230	11	1	2								
	6000												
	7800												
Infiernillo			12	1A			6	3					
						8200	7	2	1				
							8	1		8540	12	1	
	9000												

7,500 words

This stage in the development of Meso-American civilization is ~~[illegible]~~ characterized by a subsistence pattern mainly based on plant collecting and incipient agriculture. It falls between the earlier stage, where the subsistence was based on hunting and the later stages based on agriculture. In this brief article I shall hope to point that even the meager archaeological data so far uncovered is beginning to demonstrate that there are a number of other material and non-material cultural ~~characteristics~~ features diagnostic of this stage as well as some significant areal and sequential ~~cultural~~ developments within this stage.

Present evidence indicates that this stage falls within the general time period from 8 or 9 thousand years ago to 3000 or 4000 years ago. Future research and more well dated archaeological information will undoubtedly show that this stage began earlier and lasted later in ~~some~~ areas than others. In terms of geological ~~and climatic~~ period much of this stage is contemporaneous with the geological period called the post-glacial optimum from 7,500 or 7,000 to 4500 or 4000 years ago though it may have begun just before and ended just after this geological epoch. Scientist concerned with climatic change consider that this time period to have been warmer than the preceding one and perhaps warmer than today. Many believe that it was ~~perhaps~~ drier than the preceding and following periods as well as today but a few believe it was a wetter phase. There is insufficient information available at present to decide the matter conclusively, but I in spite of this find myself favoring the former viewpoint. Paleontologically

this seems to have been the period in which modern fauna (& flora?) became dominate ~~and~~

Furthermore many of the diagnostic animals of the Pleistocene seemed to have become extinct either early in the period or just before it.

The area to be considered is from the tropic of Cancer to Honduras - roughly Meso America. Most of the latter developments of the so called "high cultures" seem to fall within this ethnological culture area. Whether the ancestors of these "high culture" or whether the culture phases of the stage of Plant collecting and Incipient agriculture, also, were confined within the boundaries of this culture area is doubtful. Quite frankly I would not be the least surprised if future research shows that at this stage there was a fair degree of cultural uniformity from the American Southwest and Texas to northern South America.

¶ → For convenience sake, however, we will confine our discussions to finds of human remains belonging this cultural stage within the boundaries of Meso-America. Actually few culture phases have been defined and few components dug belonging to this ~~stage~~ period. Thus it has been possible for me, to see all the material found and ~~will be~~ it is ~~possible~~ feasible to discuss them in this brief article. They will be discussed under ~~the~~ three heading: ~~of~~; Excavations and surface collection from Northeast Mexico (of Tamaulipas and San Luis Potosi), excavation and surface collections

from the valley of Mexico (and Puebla), an excavation and surface collections from Oaxaca and western Mexico and pre-ceramic materials from southern Meso-America.

Northeast Mexico

(Players) Oasis tradition

Settlements

1. small socio-political group - variable as to size according to season

2. Large open sites around lakes or springs as well as rock shelters

3. Grass beds with matts
4. Living area around rock filled roasting hearths

Subsistence

5 Seasonal sedentary - seasonal nomadic

6. Intensive exploitation of environment most of which is non specialized, but slowly supplemented by some planted materials

7. [illegible], large amount of leaf, pod or flower "chewing" supplemented by seed harvesting

8. Early knowledge of selection process (& perhaps hybridization

Artifact

9. Early use of coiled, & twilled technique in basketry

10.) Netting simple" full turned coil & much string' -

11 Matts complex

12. Huaraches

13. Atlatl

14. Use of the chipped flint gouge .

15. Non - notched points

16. Some use of blade & polyhedral core technique

17. Pressure flaking of biface dominant

18. Flat milling stones with cobble manos

19. Some chopping - chopper tool, scraper plane artifacts

20. digging stick

21. Blunt points

22. Twined & stitched type of coiled basketry

23. multitude of ovoid bifacial knife or dagger-like tools

24.

25 pierced bone awl common

26 Small shell beads un-cut & ground bone beads,

27 net & sinker stones

28 Chewing & sucking of concentrated (protein) food,

29 Vegetable quids

30 Dogs at least by 4000 B.C.

	L	CF	CP	CM.	Cm.	Totals
	87	07	3	3		
San [illegible]	152	12	6	5	0	175
	63	11	23	2	4	
San Lorenzo	237	42	86	9	2	376
	73	07	04	06		
Palmillas	104	9	12	8	1	134
	14	5	80	01		
Guaje	19	17	100	2		138
	34	9	57			
Suerra	43	11	72	1?		127
	3	51	42			
Fresno	4	73	55			132
	642~~3~~	16	20			
Ocampo	87	22	28			137
	12	38	50			
[illegible]	2	6	8			16
						1235

Brown envelopes

La Perra Culture	2 seeds - *C. pepo*
La Perra Cave (Tm c 174)	
Laguana Culture	1 seed - *C. pepo*
La Perra Cave (174	1 peduncle - *C. pepo*
	1 rind fragment - Lagenaria
	1 rind fragment - *Cucurbita* sp. (probably *C.pepo*)
	9 rind fragments - Wild *Cucurbita* sp.

Los Angeles Culture Bluish-white envelopes with red band

314/201	1 rind fragment - *Lagenaria*
314/206	9 rind fragments - *Lagenaria* ?
314/208	About 18 rind fragments - *Lagenaria*
314/222	1 rind fragment - *Lagenaria*
314/229	1 rind fragment - *Lagenaria*

5 C. pepo

17 Lagenaria

Ocampo Caves

Ocampo Culture Site 247, Occupation 3	247/13	(1 rind - *C. pepo* ((7Rind fragments of *Lagenaria*
Mesa de Guaje Culture Site 247, Occupation 10 ?	247/3	(1 peduncle - *C. pepo* (1 " - *C. moshcata* (1 rind fragment - *Lagenaria* (3 rind fragments - *Wild Cucurbita* sp.
PaLmillas Culture Cave 247, Occupation 11	247/55	2 seeds - *C. pepo*
	247/43	1 peduncle or stem may not be cucurbit
Palmillas Culture Cave 274, Level 2, Occupation 3	247/25	1 peduncle - *C. pepo* 17 rind fragments - *Lagenaria* 2 rind fragments - *Cucurbita* sp.
San Lorenzo Culture Site 247, Occupation 13	247/179	1 seed - *C. pepo*
	247/92	(2 rind fragments - *Lagenaria* (1 peduncle - *C. pepo*
San Lorenzo Culture Site 248, Occupation 8	248/13	1 fragment - probably skull, not plant material
	248/38	Bone, not plant material
San Antonio Culture Site 247, Occupation 14	247/131	(1 rind fragment - *Lagenaria* (1 rind fragment - *Cucurbita* sp.

Stratified Components of Sierra de Tamaulipas

Sierra de Tamaulipas Sequence of phases	Tm c 81	Tm c 82	Tm c 174	Tm c 314	Tm c 315	Tm r 86	Tm r 79
Los Angeles	Layer 1	Layer 1-2	Surface (658±150)	Layer 1			
La Salta				Layer 2			Levels 1-2
Eslabones	Layer 2	Layer 3				Levels 1-3	levels 3-4
Laguna			Layer 1			Levels 4-7	
Almagre		Layer 4		Layer 3	Layers 1-4 Layer 5 Layer 6 Layer 7		
LaPerra		Layer 5	Layer 2 Layer 3 (4450±280)		Layer 8 Layer 9		
Nogales	Layer 3	Layer 6 Layer 7		Layer 4			
Lerma	Layer 4 Layer 5 (9270±500)		Layer 4 Layer 5 Layer 6				
ablo	Layer 6						

	Stratified Components of the Sierra Madre			Sierra Madre Sequence of Phases	Tamaulipas combined Phases
	Tm c 274	Tm c 248	Tm c 247		
		Acc. 10	acc 16 acc 15	San Antonio	Los Angeles San Carlos
	acc 12 acc. 11 (520+)	Acc. 9	acc 14 acc 13	San Lorenzo	San Lorenzo
1000					
	Acc. 10 Acc. 9 Acc 8		acc 12 acc. 11 (1720±200)	Palmillas	La Salta Palmillas
					Palmillas Eslabones
					Laguna
			Acc 10 (3440± acc. 9 (3650±	Mesa de Guaje	Mesa de Guaje
			acc 8 acc 7 acc 6 (4730±) acc. 5	Guerra	Guerra
4000	ac 2-7	acc. 8 (3945±200		Flacco	Flacco (Almagre)
5000		acc 7 acc 6 (5650) acc. 5 acc. 4	acc. 4 (4580+) acc. 3 acc. 2 acc. 1 (5230±	Ocampo	La Perra [illegible]
6000					Ocampo Nogales
7000					
8000	Acc 1 (8540±400)	acc 3 (8200) acc. 2 acc. 1	acc. 0	Infiernillo	Infiernillo
					Lerma
10000					Diablo

American Cr

	Species	Infer-nillo	Ocampo	Flacco	Guerra	Palm-illas	San Lor-enzo	San An-tonio	Total
[illegible]	*Didelphys marsupialis*					1	2		3
[illegible]	*Sylvilagus brasiliensis*			1		1	1		4
	" Sp. indet.			1			1		2
[illegible]	*Lepus californicus*						1		1
[illegible]	*Sciurus aureogaster*						2		2
	" *alleni*			1			1		2
[illegible]	*Heterogeomys hispidus*						3		3
[illegible]	*Sigmodon hispidus*					1	2	1	4
[illegible]	*Neotoma angustapalata*					1	6	1	8
	" sp. indet.		1	1		1	6		9
Gray fox	*Urocyon cinereoargenteus*						1		2
dog	?*Canis* (domestic)		1				1		2
Cacomistle	*Bassariscus astutus*	1	2	2			3		8
[illegible]	*Mephitus macroura*							1	1
[illegible]	*Conepatus leuconotus*	2	1						3
[illegible]	*Tayassu tajacu*			1		1	3	1	6
[illegible]	?*Mazama*							1	1
[illegible]	*Odocoileus virginianus*	3	5	7	1	2	15	16	51
	" *hemionus*						2	1	3
	" sp. indet.			2			4	1	10
[illegible]	*Bison bison*						4		5*
	Total	6	10	16	1	8	58	23	130

248-L20, AL2-1 *Sylvilagus brasiliensis*, 1 *Odocoileus virginianus*

248-L4-6, AL2/7-1 *Urocyon cinereoargenteus*

248/115-1 *Odocoileus* sp. indet.

248/L12, ALWCH-1 *Odocoileus virginianus*

248/L4, AL6-*Odocoileus* sp. indet.

248-L4, AL7-*Odocoileus* sp. indet.

* I'm not sure how Kooyman arrived at this figure for *Bison*. Perhaps he had one from another cave level. The record is interesting of course.

All the rest of the mammals occur in the Gómez Farías region today.

248 - 4 (122 - 167) - Ocampo (3 specimens

wild bean |
bean pod: 𝍸 𝍸 𝍸
bean seed tissue 𝍸𝍸 ||
corn cob - ? ? — pick — specimen 3
specimen 1
animal tissue
pod tissue

247 - level 9 - area 4 - Occampo - 168 - 199
corn silk 𝍸 |
" " with pollen 𝍸
bean pod |
bead seed ||
capsicum 𝍸 |
animal tissue |

---

248 - 7 - (199 - 246) Infiernillo
bead seed 𝍸 |
bean pod 𝍸 𝍸 𝍸
squash ?
capsicum - ? ? ?
grass leaf |
legume ||
small seed of fruit (berry) ?
leaf
fibers
animal tissue |
fibers
legume

248 - 6 (247 - 253) — Infiernillo
bean 𝍸
bean pod ||

248-4 (122-167) - Ocampo (3 specimens

wild bean |
bean pod: 𝍸 𝍸 𝍸
bean seed tissue 𝍸 𝍸 ||
corn cob - ? ? pick specimen 3
specimen |
animal tissue
pod tissue

247 - level 9 - area 4 - Ocampo - 168 - 199

corn stalk 𝍸 |
" " with pollen 𝍸
bean pod |
bean seed ||
capsicum 𝍸 |
animal tissue |

---

248 - 7 - (199 - 246) Infiernillo

bean seed 𝍸 |
bean pod 𝍸 𝍸 𝍸
squash ?
capsicum - ? ? ?
grass leaf |
legume ||
small seed of fruit (berry) ?
leaf
fibers
animal tissue |
fibers
legume

248 - 6 (247 - 253) - Infiernillo

bean 𝍸
bean pod ||

248 - 5 - (254 - 266 Ocampo.

crustacean |

succulent fruit? 𝍸

small bone rodent |||

247 - level 4b - (267 - Herrera.

¹ corn kernel - |

corn cob - ||||

bean seed |

²

bean |

animal bone |||

fish |

bean seed 𝍸

bean pod |

	2	3	4	5	6	7	8	11	12	14
San Antonio Culture										
Tm c 247, Occupation 16	35	157	793	992	66	1	6443	491	40	23
Tm c 247, Occupation 15	14	95	163	306	24	1	1987	117	6	4
San Lorenzo Culture -274- [illegible]										
Tm c 248, Occupation 8	44	96	103	47	5	5	611	256	22	
Tm c 248, Occupation 7	116	44	34	54	30	3	453	52	77	24
Tm c 247, Occupation 14	164	105	1042	1114	56		2493	1293	59	27
Tm c 247, Occupation 13	214	158	1116	1331	60	1	3468	707	78	17
Palmillas Culture										
Tm c 274, Occupation 3-5	52	29	69	76	249		108	89		
Tm c 247, Occupation 12	63	29	203	129	13		770	105	22	6
Tm c 247, Occupation 11	222	116	401	315	48	19	1543	120	51	35
Mesa de Guaje Culture										
Tm c 247, Occupation 10	41	18	81	47	28		157	44	16	37
Tm c 247, Occupation 9	47	18	46	32	14		189	10	4	3
Guerra Culture										
Tm c 247, Occupation 8	42	33	46	29	31	6(?)	37	43	7	29
Tm c 247, Occupation 7	18	19	25	9	23	13	30	31	75	7
Tm c 247, Occupation 6	26	5	33	33	25		66	13	13	7
Tm c 247, Occupation 5	9		17	1	24		14	13	15	31
Flacco Culture -274- [illegible]										
Tm c 248, Occupation 6	57	78	43	73	44	9	2575	74	76	
Ocampo Culture										
Tm c 247, Occupation 4	59	6	9	3	137		95	44	7	11
Tm c 248, Occupation 5	113	28	2	5	1	4	564	3	58	4
Tm c 248, Occupation 4	74	8	5	2		2	300	19	35	3
Tm c 247, Occupation 3	8	6	2	1	26			18	6	23
Tm c 247, Occupation 2	6	4					9	2		178
Infiernillo Culture										
Tm c 248, Occupation 3	113	21	17	68		3	258	11	95	13
Tm c 247, Occupation 1	0									
Tm c 248, Occupation 2	25	8	4	1	13	1	39	64	15	
Tm c 248, Occupation 1									4	
Totals										

55	40	69	26	27	[illegible]
		1 1	4	1	12,203 + 275 + 6524 19,002 4361 2842
42	2	2			17,354 + 1015 + 10,723 = 29,092 1360 1071 7274 7709
					5421 + 336 + 3,203 = 8,960 721 1436 3 264
					1163 + 30 + 870 = 2,063 698 465
					1007 + [illegible] + 547 = [illegible] 360 262 242 143
					3145 + 112 + 150 = 3,407
					2031 + 332 + 210 = 2,573 408 805 483 130 205
					809 + 457 [illegible] 620 185 4
					43,133 + 3 835 + 21,930 [illegible]

7	17	25	54	55	56	24	28	21	1	16	15	18	19
								1	35	36	15	4	4
1	3					1	14	25	14	4	3	2	
		8					5		10	23	25		
1		4	2	28	1	1	4	4		10	21		
1	2					3	111		41	80	21	1	
1	2						146	1	44	18	13	1	
1									4	16	7		
						1	69		3	2	1	1	
	3	1				3	290	6	12	5	16	1	1
	181						8		5	5	5	1	
									5		1	2	
						3	11	1	3				
							3	1	2	3	3		
							1		1	4	2	2	1
							1		1		2		
	1							20	1	90			
	2						12		1	4	7	7	1
						3	5	1		4	1		2
	11	1				13	6	1		3			
	2						2	20	1		2	11	1
											2	4	
	10	5			1	2	2			1(?)			
1	1		2	2	7	2							

	20	30	31	32	49	13	10	4	45	39	23	34	29	35
			4	2			37	149				1	25	
						2	7	38			1		9	
7				2		4	2	3			1		6	2
				3		3	2	1			1			1
			8	3			10	98		6			22	
			12	4		1	6	180			3		102	17
4											5		12	
							3	11			1		3	
1			2	8		1	19	11			3	1	8	
1			1				3	6					12(?)	1
						2							2(?)	
				20				3		1	3	1	11(?)	
			1					4					5(?)	
				6										
						2			2					
		1	1	1										
		1			4		1(?)	1(?)						
1														

36	38	41	[illegible]	22	42	43	44	46	47	48	50	51	
1													
		1	1		1						2	10	12
		1			1	9	8	7	5	6			
2	3			11									
	2	2	2	2									
1													
	1	1											
1													

	Tm c 247			Tm c 248			Tm c 274		
CULTURE	C.14 date	Level	Occ.	C.14 date	Level	Occ.	C.14 date	Level	Occ.
San Antonio		1	16						
		1A	15						
San Lorenzo		2	14		1	8		1	12
		2A	13		2	7	520	2	11
Palmillas	1956	3A	12					3	10
	1720	3	11					4	9
	36							5	8
Mesa de Guaje	3440	4A	10						
	3650	4	9						
Guerra		4B	8						
		5	7						
	4730	6	6						
		7	5						
Flacco				3945	3	6		6-11	2-7
Ocampo	4580	8	4						
		9	3	5650	3A				
		10	2		4	5			
	5230	11	1		5	4			
Infiernillo		12	1A	8200	6	3			
					7	2			
					8	1	8540	12	1

SIERRA MADRE COPROLITES

(a) Tm c 247 level 4a S25E3 Mesa de Guaje

(carbon-dated 3440 years)

Coprolite 1. (cont'd with Slides Nos. 63-66).

Slide No.	
1	Feather, immature
2	Epidermic
3	*Cucurbita moschata*? and endosperm
4	
5	
6	Corn, young cob chewed; Animal hairs
7	----------do---------- -----do-----
8	

Coprolite 2 (cont'd with Slides Nos. 67-72)

9	*Cucurbita moschata* seed coat
10	-------do--------- -----do--
11	-------do--------- -----do--
12	-------do--------- -----do--
13	-------do--------- -----do--
14	Seed, Compositae?
15	Animal hairs
16	
17	
18	
19	

Coprolite 3

20	Pod of legume, immature seeds.
21	Legume, immature seed.

22 Pod of Legume, immature seed

Coprolite 4

23 Seed coat - hard; shaped like cucurbit.

24 -----do--------- -------do------------

25

26 Seed coat - hard - Teosinte?

27 -----do--------- ---do---

28 Larval skin)probably blow fly

29 Larval skin)probably blow fly

Coprolite 5

30 Bean, pod tissue

31 ----do---- and some corn (kernels)

32 ----do---- (")

33 Bean epidermis (pod) and tissue

Coprolite 6

34 Corn, young cob chewed and something else

35 -----------do----------

36 -----------do---------- and something else

37 Bones, bird

Coprolite 7

38 Seed of Gramineae - Panicum sp.?

39 Corn

40 Corn

41 Corn?

42 Corn?

43 Corn?

44 Corn - husks from tip of young cob?

45 Corn - husks?

Coprolite 8

46 Bean leaf

47 ----do----

48

49 Bean pod

50

51

52

Coprolite 9

53 Cucurbita seed coat

54 --------do---------

55 --------do---------

56

57

58

59 Cucurbita seed coat

60

61

62

Coprolite 1 (cont'd).

63 Cucurbita seed coat

64 Cucurbita endosperm

65 ----------do-------

66 Bean (small, hard), lima?

Coprolite 2 (cont'd)

67 Fly larva

68 Larva of Famia sp. (Lesser House fly?)

69 Larva of blow fly?

70 Larva of blow fly?

71 Larva of blow fly?

72 Larva of blow fly?

(b) Tm c 248 level 3 S10E5 Flacco

Coprolite 1

73 *Cucurbita* seed coat

74 -------do----------

75

76 Larva; Corn, portion chewed cob.

77 Larva

78 Bean coat

79

80 Bean, small, lima?

81 -------do---------

82 -------do--------- squashed

83 -------do--------- ---do---

Coprolite 2

84 Bean, small, lima? squashed

85 ------do--------- ---do---

86 ------do--------- ---do---

87 Bean, small, lima?

88	Bean, small, lima?
89	--------do--------
90	Bean and ? mixed
91	Bean?
92	Bean
93	
94	
95	

Coprolite 3

96	Bean, small, lima?
97	
98	
99	
100	
101	Bean, small, Lima.
102	
103	
104	
105	
106	
107	
108	
109	
110	
111	
112	

113

114

Coprolite 4

115 Corn - portion of young ear chewed also Bean

116

117

118 Seed of Gramineae - Panicum sp.?

119

120

121 Capsicum seed

SIERRA MADRE COPROLITES

Slide No.	Cave No.	Level	Coordinates	No. Coprolites Examined
1- 75	C 247	4A	S 25 E 5	9
76-121	C 248	3	S 10 E 5	4
122-167	C 248	4	S 10 E 5	3
		4A	S 10 E 5	
168-198	C 247	9	S 25 E10	1
199-246	C 248	7	S 10 E10	1
247-253	C 248	6	S 10 E 5	1
254-266	C 248	5	S 10 E 5	1
267-300	C 247	4B	S 25	2
301-371	C 247	4A	S 25 E10	7
372-416	C 247	4B	S 25 E10	4
417-443	C 247	4	S 25	4

SIERRA MADRE COPROLITES

CAVE	CULTURE	AGE IN YEARS		LEVEL	COORDINATES	SLIDE NOS.	NO. COPROLITES EXAMINED
		Tentative	C^{14} Date				
C 248	Infernillo	7500-9000	-	7	S10 E10	199-246	1
C 248	Infernillo		8200	6	S10 E 5	247-253	1
C 248	Ocampo	4300-6000	-	5	S10 E 5	254-266	1
C 248	Ocampo		5650	4	S10 E 5)	122-167	3
C 248	Ocampo			4A	S10 E 5)		
C 247	Ocampo			9	S25 E10	168-198	1
C 248	Flacco	3800-4300	3945	3	S10 E 5	76-121	4
C 247	Guerra	3400-3800		4B	S25 E10	372-416	4
C 247	Guerra			4B	S25	267-300	2
C 247	Mesa de Guaje	2400-3400	3650	4	S25	417-443	4
C 247	Mesa de Guaje			4A	S25 E10	301-371	7
C 247	Mesa de Guaje		3440	4A	S25 E 5	1-75	9
C 247	Palmillas	1100-1800	1720	3	Nil	Nil	Nil
C 247	Palmillas			3A	Nil	Nil	Nil
C 248	San Lorenzo	500-900		2	S10	Nil	Nil
C 248	San Lorenzo			1	S10 E 5	Nil	Nil
C 247	San Antonio	200-500		1	S25 E10	Nil	Nil

SIERRA MADRE COPROLITES

Culture	Cave 247	Cave 248
Infernillo		7 - Bean 6 - Bean Capsicum
Ocampo	9 - Corn, Capsicum?, Bean? silk + pollen	5 - Cucurbita, bones 4A)) Bean, Corn 4) ~ Capsicum [illegible]
Flacco		3 - Cucurbita, Bean, Corn, Panicum, Capsicum. cocc.
Guerra	4B - Corn, only. bean, Panicum, Cucurbita, seeds of?	
Meso de Guaje	4 - 4A - Cucurbita pepo, Corn, Bean, Composite seed; sunflower Bird bones, eggshell, Panicum.	
Palmillas		
San Lorenzo		
San Antonio		

9/12/55

Identification of the Cucurbit Materials
from two caves near Ocampo, Tamaulipas, Mexico

INFIERNILLO CULTURE

Site 248 - Occupation 2 - 3 -- missing
" 247 - Occupation 1 -- missing
" 248 - Occupation 8 or 1

level 6 — Rinds, 248/10, several pieces (10) of thin-shelled, Lagenaria rinds
Seeds, 4 seeds and 3 fragments, C. Pepo - (15.0 x 8.5 11.5 x 8.0) (15.5 x 9.0 10.5 x 8.0)

level 7 248/141 — Seeds, 6 seeds, C. foetidissima - (11.0 x 7.5 10.0 x 6.0) (11.0 x 7.0 10.0 x 7.0) (9.0 x 7.5 10.0 x 7.5)

Rind, 1 fragment, C. pepo

PORTALES CULTURE

Site 248 - Occupation 4 - 5

74 — 1 Lagenaria

level 5 — Rinds 248/9, 3 pieces, C. pepo
Seeds, 248/148, 7 seeds, C. pepo } Labeled - Squash seed, level Bb

Flacco

~~Seed measurements~~

(11.0 x 7.5 11.5 x 9.0)
(8.5 x 6.5 10.5 x 8.0)
(11.0 x 8.0 12.0 x 7.5)
12.0 x 8.5

9 — Rinds 248/109 — 10 Rinds of pepo
1 " " Lagen.
1 fowl.

Site 247 - Occupation 2

Peduncle - 1, C. pepo

Site 247 - Occupation 3

Rinds, 247/27, 3 fragments of Lagenania
" , 247/27, 1 fragment of C. pepo
Peduncle, 247/27, 1 C. pepo
" , 24729, 1 C. pepo
Seeds, S2549, 247/61, 1 seed, C. pepo - 13 x 8.5 ✓
247/61, 4 seeds, C. pepo (15 x ? 12.5 x 8.5) (13.5 x 9 13.0 x 8.5)
247/27, 5 seeds, C. pepo (14.0 x 8.0 ✓ 12.0 x 9.0) (11.5 x 7.0 11.5 x 7.0) (12.0 x 7.0)

Site 247 - Occupation 4

Seeds, 247/26, 2 seeds, C. pepo (15.0 x 9.0 10.5 x 6.5 9.0 x 6.0) (15.5 x 10.0 8.0 x 6.0)
5 seeds, wild Cucurbits (9.0 x 8.0 10.5 x 7.0)
Rinds, about 50 fragments of Lagenaria
3 fragments of Cucurbita sp.
Seeds, 247/12, 1 seed wild Cucurbita sp. and fragments (12.0 x 8.5)

1
2
3
4
5
6
7
8

Peduncles, 247/12, 1 peduncle, C. pepo; 3 other fragments of peduncles-
not identifiable
Rinds, 247/12, about 20 fragments, Lagenaria; 6 fragments - Cucurbita sp.
Seed, 247/60, 1 seed, C. pepo ? (12.0 x 9.0)

FLACCO CULTURE

Site 248 - Occupation 6

Rinds (~~5~~ 1 fragments, thick Lagenaria 248/30 — 2
3 (25 " thin "
1 (~~32~~ " C. pepo
248/30 — (17 " wild Cucurbita sp.
ok Rinds and seeds, 248/30, 2 seeds, 5 fragments of rind; all C. foetidissima ?
Peduncles, 248/121, 5 peduncles and 1 blossom end (4 C. pepo
(1 probably C. Pepo
(blossom end - Lagenaria

acc 7
Seed, 248/140, 1 seed, cucurbit-not identifiable(fragment)
acc 7 Seed, 248/87, L2, 1 seed, C. pepo (12.0 x 8.0)
Seeds, 248/38, L2, 2 seeds, 1 C. pepo (15.0 x 9.5)
1 unknown (10.0 x 9.5)
acc 7 Seeds, 248/146, L2, 5 seeds, several fragments (1 Lagenaria - 16.0 x 7.5
(4 C. pepo - (15.0 x 9.0)
(10.0 x 6.0)
(13.5 x 9.0)
(15.0 x 9.5)

ok Seeds, 248/5, L1,3 - 3 seeds(2 C. pepo (12.0 x 9.0 14.0 x 10.0)
1 unknown, probably C. foetidissma 11.0 x 8.0
acc 7 out Seeds and rind, 248/29, L1-3, (3 seeds, probably C. foetidissma (10.0 x 7.5
8.5 x 6.0)
(1 fragment (rind) probably C. foetidissma
4-5 accomple Rinds, 248/104, L3, about 10 rind fragments of C. pepo
1 rind fragment of Lagenaria
3 ok Rinds, 248/103, L20, about 19 rind fragments of C. foetidissma
Rinds, 248/104, E2513, 11 rind fragments, probably all C. foetidissima
4-5 acc Rinds, 248/31, about 30 rind fragments, probably C. foetidissma
3 ok Rinds and ~~s~~Seeds, about 35 rind fragments loose in envelope with two seeds,
C. pepo (13.0 x 9.5 11.5 x 9.0)
acc 7 Seeds, 248/98, L2~~5~~-3, 13 seeds, all C. pepo (10.0 x 7.0 12.0 x 8.5)
10.5 x 7.0 12.5 x 9.0
10.5 x 7.0 13.0 x 9.0
10.0 x 7.5 13.0 x 9.0
11.5 . 8.0 12.0 x 8.0)
14.5 x 9.5)

Rinds, 13 fragments (3 Lagenaria
(10 C. foetidissima ?

ok 248/145 — 7 seeds of pepo

GUERA CULTURE

Site 247 - Occupation 5

Peduncles - 1 *C. pepo*
1 unidentified, not *Curcurbita* or *Lagenaria*
Seed, 247/72, 1 seed, *C. pepo* (12.0 x 8.0)
Rinds 248/72, 25 small rind fragments, probably *C. pepo*
Seeds, 247/25, 2 seeds - 1 *C. pepo* 14x 8.0
1 *C. foetidissma?* 9.5 x 6.0

Site 247 - Occupation 6

Peduncles, 2 peduncles, probably *C. pepo*, but might be *C. moschata*
Rinds, 3 fragments - 1 *Lagenaria*
2 unidentified
Rinds, 2 fragments, both *Lagenaria*

Site 247 - Occupation 7

Rinds 248/14, fragments of *Lagenaria* rind
Seeds 247/58, *C. pepo* seeds

11.0 x 9.0	12.5 x 9.0	11.5 x 7.5
14.0 x 9.0	13.0 x 9.0	12.5 x 9.0
13.0 x 10.0	12.0 x 8.0	14.0 x 8.5
13.8 x 8.0	12.0 x 8.5	11.5 x 9.0
13.5 x 8.0	12.0 x 8.0	13.0 x 8.0
11.0 x 8.0	13.0 x 8.0	12.0 x 8.0
12.0 x 5.8	11.0 x 8.0	13.0 x 8.0

Seeds 247/107, 3 seeds, *C. pepo*
13.0 x 9.5
14.5 x 9.5
14.5 x 9.5

Seeds, S25 L5, 14 seeds, *C. pepo*

12.5 x 8.0	13.0 x 8.0
13.5 x 9.0	13.0 x 8.0
12.0 x 9.0	13.0 x 8.5
14.0 x 9.0	12.0 x 8.5

only 8 measurable

Site 247 - Occupation 8

Rinds - 5 fragments of *C. pepo*
29 " " *Lagenaria*
Rinds, 247/316c, fragments of *Lagenaria*, almost complete fruit
Seeds, 247/48, L25 W5L5, 7 seeds, *C. pepo*

12 x 10.0	12.0 x 7.5
12.5 x 9.0	13.9 x 8.0
13.0 x 9.0	10.5 x 8.0

Seeds, 247/16, 4 seeds, *C. pepo*
13.0 x 9.5
13.0 x 9.0
13.0 x 9.0
Seeds, 247/79, 2 seeds, *C. pepo* - 13.0 x 8.0

MESA DI GUAJE CULTURE

Site 247 - Occupation 9

Rinds, 247/36, 9 rind fragments of *Lagenaria*
Peduncle 247/54, 1 peduncle, *C. pepo*
Seeds 249/54, S25 L4, 4 seeds - 3 *C. pepo* 12.0 x 9.0 12.0 x 8.0
12.0 x 8.5
1 *C. foetidissma?* 10.5 x 7.0
Seeds and rind, S25 E10 4A, 1 rind fragment, *C. foetidissma*

1 *C. pepo* seed 14.0 x 9.0

5 wild *Curcurbits* sp. seeds (12.5 x 8.0
12.0 x 8.0
10.0 x 7.0
10.0 x 7.5
10.0 x 7.0)

Site 247 - Occupation 10

Seeds, 5 seeds, all *C. pepo* (14.0 x 10.0 13.5 x 8.0
15.0 x 10.0 14.0 x 9.5)

Rinds, 2 fragments of *C. pepo* rind

Seeds, 2 seeds, *C. pepo* (17.0 x 9.5 14.5 x 9.0)

Seeds, 12 seeds, *C. pepo* (14.0 x 9.0 13.5 x 8.0 11.0 x 8.0 14.0 x 9.0
13.0 x 8.0 13.0 x 8.5 13.0 x 8.5 11.5 x 8.0
12.0 x 7.5 12.5 x 9.0 12.0 x 8.0)

Seeds, 5 seeds, *C. foetidissma?* (10.0 x 6.0 11.0 x 7.0
10.0 x 6.0 10.0 x 7.0)

Peduncle, 247/68, *C. moschata*

Rinds, 5 fragments of rind of *Lagenaria*

Rinds, 4 fragments; 2 fragments of *Lagenaria*; 2 fragments of *Cucurbita* sp.

Seeds, 5 seeds of *C. pepo* from feces-like mass (16.0 x 9.0 13.0 x 9.0
13.5 x 8.5 13.0 x 9.0
13.0 x 8.5)

Seeds, 247/47, 3 seeds of *C. pepo* from feces-like mass (13.5 x 9.0
12.5 x 9.0
13.0 x 8.5)
Fecal material contains large fragments of vegetable material, among it several undamaged seeds.

Seeds, 247/57, 2 *Lagenaria* seeds; about 65 seeds of *C. pepo*, quite variable in size; measured several individuals in ~~lack~~ each size class.

Large	Medium	Small
16.0 x 11.0	14.0 x 9.5	13.0 x 8.0
16.0 x 11.0	13.0 x 9.0	13.0 x 8.0
	13.0 x 9.5	14.0 x 8.0
	13.0 x 9.0	13.0 x 7.5
	11.5 x 9.0	12.0 x 8.0

PA~~S~~MILLAS CULTURE

Site 247 - Occupation 11

Peduncle, 6 peduncles; 4 *C. pepo* (very diverse); 1 *C. ~~multa~~ mixta*; 1 *C. moschata*

Rind, 247/77, 1 fragment of *Lagenaria*

Rind 247/45, 1 fragment of cultivated *Cucurbita* sp.

Seed, 247/88, 1 seed, *C. pepo* 14.0 x 9.0

Seeds, 2 seeds, *C. pepo* - 12.0 x 9.0 19.0 x 11.0

Rinds, 75 rind fragments of *Lagenaria*; 4 rind fragments of cult. *Curcurbita*; 5 rind fragments of *C. foetidissima?*

Site 247 - Occupation 12

Rinds, 11 fragments of rinds of *Lagenaria*; 5 fragments of *C. moschata*; 2 fragments of *C. foetidissima?*

Peduncles, 2 peduncles, *C. moschata*

Seed, 1 seed, *C. pepo* - 17.0 x 12.5

SAN LORENZO CULTURE

Site 247 - Occupation 13

247/18 ? (not Cucurbitaceae)
247/102 Peduncle, 1 peduncle, C. pepo
247/122 " , 1 peduncle, C. moschata
247/180 " , 1 peduncle, C. moschata
247/185 Seed, 1 seed C. mixta?? (20.5 x 13.5)
247/267 Seed, 1 seed C. moschata (18.0 x 12.5)
Rinds - about 75 fragments of Lagenaria rind
7 fragments of C. foetidissima? rind
6 " " C. moschata and C. pepo rind

Site 247 - Occupation 14

Rinds, about 50 fragments of Lagenaria rind
10 " " C. pepo "
2 " " C. foetidissima ? rind
247/16, Rinds, {3 fragments of C. pepo rind
{6 " " Lagenaria rind
Peduncles, {3 peduncles, C. pepo
{1 peduncle, C. ficifolia or C. moschata
Stem, 1 piece of Cucurbita stem, including portion of the node
Seed, 247/139, 1 seed, C. pepo - 17.0 x 9.0
Seed 247/213, 1 seed, C. pepo - 18.5 x 11.0

Occupation 7 ——— 248/121 248/140 [illegible]

Site 248 - Occupation 8

Rinds, about 75 fragments of Lagenaria rinds
11 " " C. foetidissima? rinds
1 " " C. pepo rind
ok Seeds L1, 248/124, 15 seeds, C. pepo in feces-like moss
ok Seed, 248/124, 1 seed, C. mixta ?
ok Seeds, 248/28, L1, {3 seeds, C. pepo
{1 seed, C. foetidissima
ok Seed, 248/58, L1, 1 seed, C. pepo - 17.0 x 10.0
ok Seed, 248/107, L1, 1 seed, C. pepo - 17.0 x 9.0
ok Seed, 248/142, L1, 1 seed, C. foetidissima ?

SAN ANTONIO CULTURE

Site 247 - Occupation 15

Rinds, about 50 rind fragments of Lagenaria; 2 rind fragments of C. foetidissima?; 1 fragment of C. moschata ?
Seeds, 1 seed C. pepo - 20.0 x 12.5

Site 247 - Occupation 16

Rinds, about 100 fragments of Lagenaria; 5 fragments of Cucurbita sp., probably C. foetidissima.
Peduncle, 247/31, 1 peduncle, C. pepo
Rind 247/112, 1 fragment, stem end of Lagenaria
Rind 247/260, 1 fragment, stem end C. moschata
Peduncles, 4 peduncles, 2 C. pepo; 2 C. moschata
Seed, 247/130, 1 seed, C. pepo
Seeds, 2 seeds, 1seed C. pepo; 1 seed C. moschata ?

[illegible] ⑨ ~~7~~ #18

"Three year foundation [illegible] for Large in the

[illegible] of Technology Theories [illegible]